Name: Date:

Exam: Function Reflections (Solution version 37)

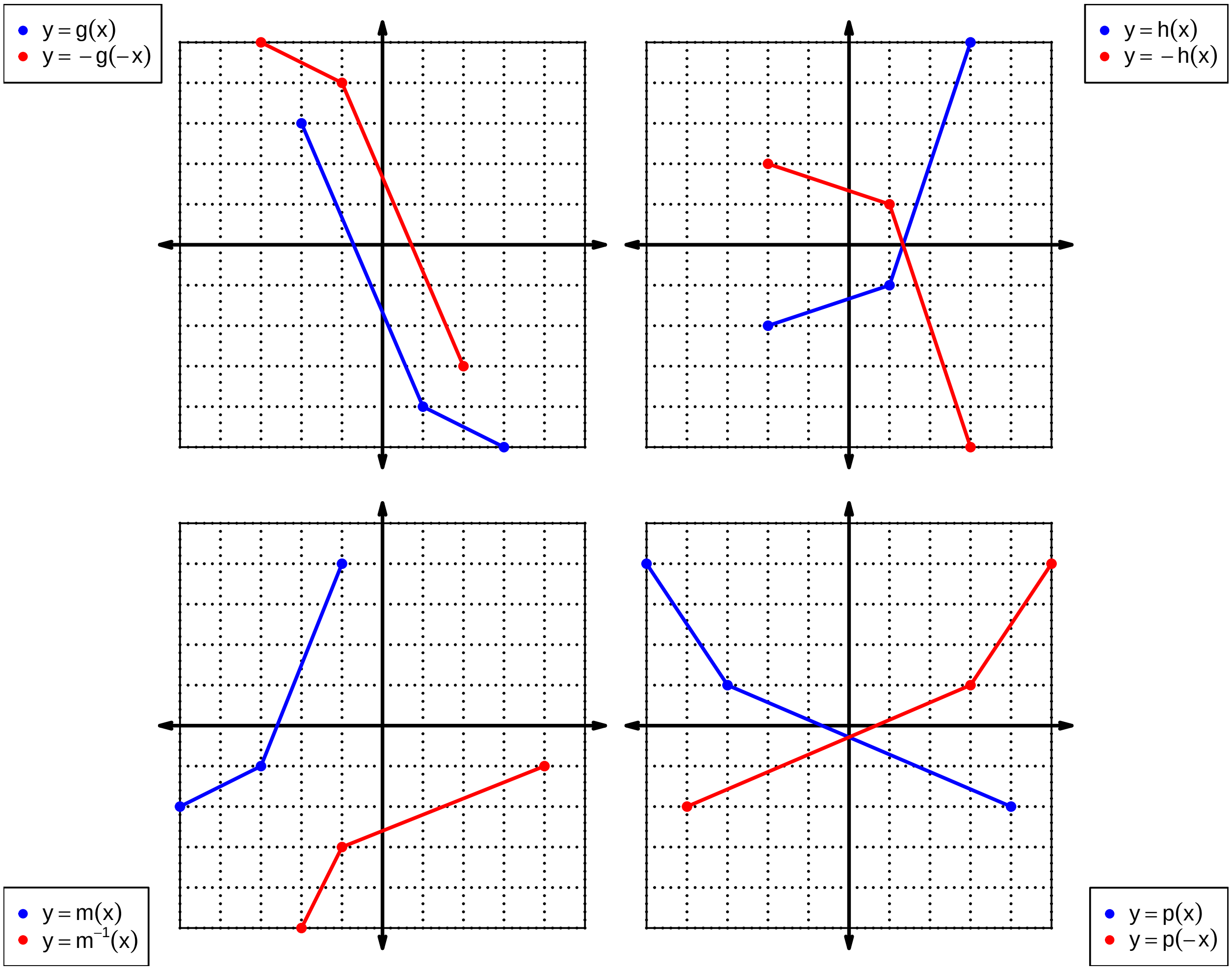
1. Let function f be defined by the polynomial below:

$$f(x) \;=\; 8x^5 + 3x^4 - 4x^3 - 6x^2 + 5x - 2$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials
$-f(-x)$	$8x^5 - 3x^4 - 4x^3 + 6x^2 + 5x + 2$
$f(-x)$	$-8x^5 + 3x^4 + 4x^3 - 6x^2 - 5x - 2$
$-f(x)$	$-8x^5 - 3x^4 + 4x^3 + 6x^2 - 5x + 2$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



Exam: Function Reflections (Solution version 37)

For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	6	7	9
2	3	4	8
3	8	6	5
4	7	5	3
5	9	2	1
6	4	8	7
7	2	9	6
8	5	1	4
9	1	3	2

3. Evaluate $g(7)$.

$$g(7) = 9$$

4. Evaluate $h^{-1}(4)$.

$$h^{-1}(4) = 8$$

5. Assuming h is an **even** function, evaluate $h(-5)$.

If function h is even, then

$$h(-5) = 1$$

6. Assuming f is an **odd** function, evaluate $f(-2)$.

If function f is odd, then

$$f(-2) = -3$$

Exam: Function Reflections (Solution version 37)

7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) \;=\; -x^3 - x$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$\begin{aligned} p(-x) &= -(-x)^3 - (-x) \\ p(-x) &= x^3 + x \end{aligned}$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$\begin{aligned} -p(-x) &= -\left(x^3 + x\right) \\ -p(-x) &= -x^3 - x \end{aligned}$$

   c. Is polynomial p even, odd, or neither?

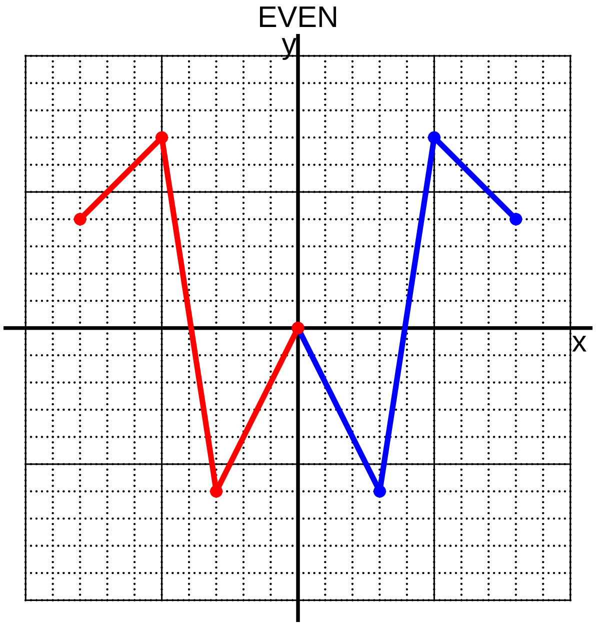
   odd

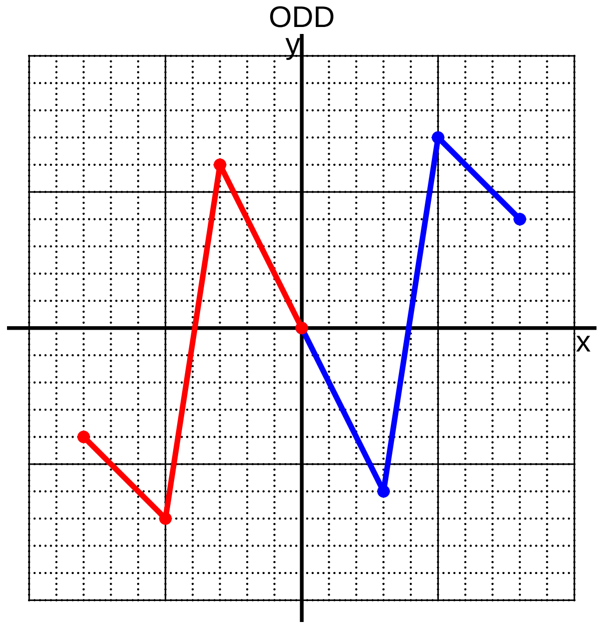
   d. Explain how you know the answer to part c.

   We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

Exam: Function Reflections (Solution version 37)

8. I have drawn half of a function. Draw the other half to make it even or odd.





9. Let function f be defined with the equation below.

$$f(x) = 9x + 4$$

a. Evaluate $f(6)$.

step 1: multiply by 9
step 2: add 4

$$f(6) = 9(6) + 4$$
$$f(6) = 58$$

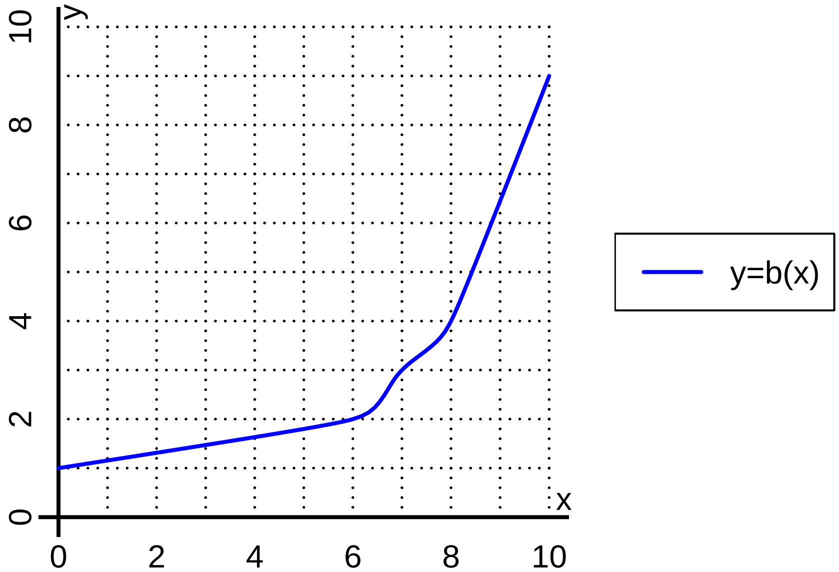
b. Evaluate $f^{-1}(49)$.

step 1: subtract 4
step 2: divide by 9

$$f^{-1}(x) = \frac{x-4}{9}$$
$$f^{-1}(49) = \frac{(49)-4}{9}$$
$$f^{-1}(49) = 5$$

Exam: Function Reflections (Solution version 37)

10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(6)$.

$$b(6) \;=\; 2$$

b. Evaluate $b^{-1}(3)$.

$$b^{-1}(3) \;=\; 7$$

Exam: Function Reflections (Solution version 37)

11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	7	-7	-7	7
-1	9	-9	9	-9
0	0	0	0	0
1	9	-9	9	-9
2	-7	7	7	-7

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.